

Name: _____ Section: _____

Atmospheric Sciences 101, Spring 2008

Homework 1 (Due at the beginning of your section, Thursday
April 10 or Friday April 11)

Turn in by 4:30 PM on the due date to receive 75% of possible credit

No assignments accepted after 4:30 PM on the due date

1. Heat Transfer Methods

Name the type of heat transfer (conduction, convection, or radiation) associated with each of the following observations:

- A. Smoke rises from a chimney.

- B. The handle of a cast iron pan feels hot after the pan has been heated for some time.

- C. You are warmed as the sun comes out from behind a cloud.

- D. The branches of the tree above a campfire sway gently.

2. Absorption and Emission of Electromagnetic Radiation

As the temperature of an object increases:

- i. What happens to the molecular motions (kinetic energy) of the object?

- ii. What happens to the wavelength of any emitted radiation?

- iii. What happens to the intensity of any emitted radiation?

3. Temperature Scales and Measurement Methods

A. Fill in the following table with the appropriate values. Round to the nearest degree.

Temperature Scale	Freezing Point of Water	Climatologically-mean Temperature on May 1 in Seattle	Boiling Point of Water
Fahrenheit		61 ° F	
Celsius			
Kelvin			

B. How would the molecular motion (kinetic energy) compare between two equal volumes of water, one at 10°C and the other at 50°F?

4. Radiative Equilibrium

Radiative Equilibrium is a balance between the incoming and outgoing radiation.

A. What would happen to the temperature on Earth if the incoming radiation suddenly became greater than the outgoing radiation?

B. As the temperature of the Earth changed according to question B, what would happen to the amount of outgoing radiation?

C. At what point would the temperature stop changing?

5. Isolething. The map (on the last page) shows isopleths and individual station measurements of cloud cover (as a percent of sky obscured by clouds). Label the isopleths, i.e. write down the percent cloud cover that each isopleth represents. The contours range from 50% cloud cover to 80%, with an interval of 5%.

